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IN

BOTANY,

OR

THE CHILD'S BOOK OF FLOWERS.

ILLUSTRATED WITH ENGRAVINGS.

FOR THE USE OF SCHOOLS.

BY THEODORE THINKER.

NEW YORK:
SAXTON AND MILES.
PHILADELPHIA: JAMES M. CAMPBELL.
BOSTON: SAXTON & HUNTINGTON.
1846.

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FIRST LESSONS

IN

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AUTHOR'S PREFACE.

I HAVE written the following pages for children. I have used the child's language, so far as was practicable, and have endeavored to dispense, in a great measure, with the technical terms of Botany. It is far from my wish to make great scholars of little boys and girls. I have aimed in this book merely to give the young student such a knowledge of Botany as is adapted to his years. Some may wonder why I did not unlock another door or two for my little friends. I can only say, in regard to the matter, that I found it necessary to stop somewhere. I could not show them the whole building; and I had to choose, not between a small part and the whole, but between a small part and none at all.

I am well aware that there is among modern Botanists of the highest standing, a growing preference for the Natural system. I have adopted the modified system of Linnæus in this book, nevertheless. In my estimation, it is simpler and better than the other, for the juvenile student. It is better for the child, because it is simpler. It is simpler, because it does not weary and perplex by its numerous divisions. For my present purpose, I must prefer the Linnæan system.

> The very head and front of my offending
> Hath this extent—no more.

The enthusiastic admirer of the opposite school, will surely throw the mantle of his clemency over so slight an offence against a system, which, in many respects, is far preferable to any other.

New York, April, 1846.

FIRST LESSONS IN BOTANY.

CHAPTER FIRST.

TWO or three years ago, I had a little friend who was very fond of flowers. Her name was Emma. I think she was six or seven years old.

One day, in the month of June, she went with me to walk in the meadow. Do you not love to hear the music of the birds? They were singing very merrily that morning. God had spread a beautiful green carpet all over the fields, and flowers of many colors and shapes seemed to smile upon us. Little Emma could not help thinking how kind and good our heavenly

---

What did little Emma think, when she saw a great many pretty flowers in bloom?

Father must be, who made all these flowers, and who taught them to bloom.

We gathered a good many of these flowers. Some of them Emma had never seen before, and she was delighted when she found a new one.

By and by, we sat down under the shade of a tree, and my little friend asked me a great many questions about flowers. She had never before looked very carefully at any particular one; and she was surprised when she did so, and still more, when she learned that there were a great many wonderful things about plants which she could not see with the naked eye, but which were seen with a magnifying glass.

I told her that the juice circulates through these delicate tubes in the flowers and its leaves, just as the blood circulates in our veins. I told her, too, that more than twenty thousand such pores had been counted in one single leaf. I pointed out the way in which the leaves do the work of breathing for the

---

What did Emma ask questions about? Mention some things which she was told about flowers.

plant, just as we take air into our lungs to purify the blood.

She was delighted with what she learned—so much delighted, that she begged I would tell her all about the flowers.

I said to little Emma, that I would gladly teach her many curious things about plants, which she did not know; but that she must not expect to learn all there was to be learned about them; because it would take a life-time, almost; and besides, there were some things about them, which no one could understand but the great God who made them.

I told her, too, that one of the most useful things for her to learn, was the way in which the different plants are *classified*, so that when she found a new flower, she could tell what class and order it belonged to, and what name to give it.

During that summer, the little girl made a

Would it take a great while to learn all there is known about flowers? Are there any things about them which we cannot know? Who knows everything about them? What is one of the most useful things to be learned in Botany? What is meant by *classifying* plants?

great deal of progress in the knowledge of flowers. I taught her how to *analyze* many, that is, I showed her how to find out, by their several parts, in what class and order they were ranked, and what there was remarkable about them.

She found this a very pleasant study, and I hope my young friends, for whose benefit I write this book, will find it so too.

This knowledge of flowers is called BOTANY, and the study of Botany includes the description of every thing in the vegetable kingdom, whether it has flowers or not.

If any of those who study my book, should become very familiar with what I tell them, I suppose they will be called BOTANISTS. At any rate, little friends, if any body should happen to call you so, you need not be ashamed of the name.

What do we mean when we talk about *analyzing* a plant? What is Botany? What does Botany include? If any one learns Botany, what is he or she called?

CHAPTER SECOND.

I WISH you were with me, and I had a handful of those beautiful flowers which Emma used to bring me when she was learning something about Botany. But as it cannot be so, I will get the engraver to make pictures of some of them, and these I will have printed for you.

They will be almost as good for our use, perhaps, as the living flowers would be, though not quite, for art is never equal to nature. I mean that God is wiser and greater than men.

I shall have to *dissect* some plants, I think, that is, to take them apart, so that I can show their different organs separately, and each of these parts I suppose must be engraved, too.

Then I can talk to you in my book, very much as I did to my little friend, Emma, and as I should to you, if you were with me;

How shall we get along in studying Botany, without living flowers? Are engraved flowers as good as living ones? If not, why? What do you mean by *dissecting* a flower?

though, to be sure, you will not have the benefit of asking me questions, as she had.

I have already said, that a very important branch of the study of Botany is to learn how to *analyze* the different plants you meet with, and I think you understand what I mean by analyzing them.

But the first thing to be attended to, is to learn the names of a few of the organs, or separate parts of plants.

Do not be alarmed, now, for fear I shall trouble you with a host of Latin and Greek names. If I was making a book for older people, I should make use of the words which botanists generally use, because they are more convenient, and one cannot become a master of the study without them. But I shall not forget that you are children, and that the use of many long and hard words would puzzle you more than they would do you good.

What is one of the most important branches of the study of Botany? What is the first thing to be attended to? What do you mean by the organs of a plant? Will it be necessary for you now to learn a great many hard names?

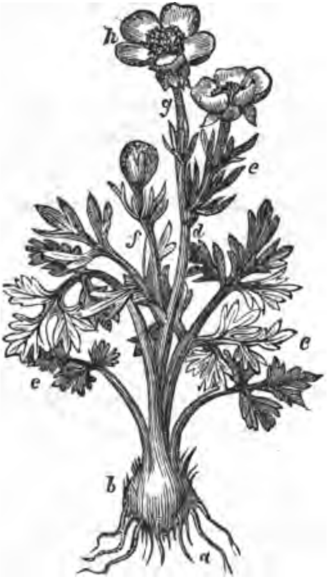
By and by, perhaps, as you go on, step by step, in learning Botany, it will be well for you to learn these names, and you will be as much pleased to learn those things which are more difficult, as I shall be to talk to you about them.

One of the flowers which Emma brought from the field, and which she admired a good deal, was the Buttercup. It is a pretty flower. Perhaps you all have seen it. I have had it engraved, and you will see it on the next page.

The flower, you know, is yellow, though the engraver cannot show you the color.

On this picture, I want to point out to you the principal parts of the whole plant, and tell their names. I will do so in the next chapter.

Would it be well to do so, if you were older? What is the name of the plant in the engraving? What is the color of its flower? Why do you not see the color in the picture? Why is it put into the book?



THE BUTTERCUP.

CHAPTER THIRD.

You see the letters which I have marked on the picture. These letters will help me to point out the different parts of the plant.

If I should put my finger on the spot marked *a*, I should show you the Root.

So *a* is the Root,
b is the Bulb,
c, the Root Leaves,
d, the Stem,
e, the Stem Leaves,
f, the Branches,
g, the Flower Stalk,
h, the Flowers.

There is nothing very hard to learn, or difficult to remember, here. Do you think there is? Well, it is because I have not used the Latin names. I thought the common ones

---

Look at the picture now, and point out the different parts of the plant. Which is the Root? Which is the Bulb? Which are the Root Leaves? Which is the Stem? Which are the Stem Leaves? Which are the Branches? Which is the Flower Stalk? Which are the Flowers? Do you think these are very hard names?

would do just as well, and please you much better.

These are names of some of the different parts of the *whole plant.*

Now we will take the *flower* by itself, and learn the names of its organs.

In the study of Botany, these organs are very important, and I want you to commit their names to memory perfectly, and be able to tell in an instant, when you see one of the organs, what it is called.

I shall not be able to get along without using a few words which, it may be, you have never heard before. But they are not very difficult, I think, and there are only twelve of them—just a dozen.

Will you remember them? Not at first, perhaps, but after a while, you will. When you have noticed very attentively each organ by itself, and given its name every time, you can tell what it is, without looking in the book, or asking any body.

Before I point out these twelve parts of the

In describing the different organs of the flower, must we use any words that are not generally understood? If so, are there many of them? How many?

flower, I will give you their names, so that, if you please, you can commit them all to memory.

Here they are. There are only twelve of them, you see.

1. Calyx,
2. Corolla,
3. Petal,
4. Stamen,
5. Filament,
6. Anther,
7. Pollen
8. Pistil,
9. Stigma,
10. Style,
11. Germ,
12. Receptacle.

CHAPTER FOURTH

Now, if you have become a little familiar with these names, we will take up a flower, and see if we cannot find the organ that each name belongs to.

I think we will not use the same plant we had before. We cannot find these parts so well on the Buttercup as we can on some other flowers. The organs are some of them

---

You may give the names of these twelve organs. In looking out these organs, is it best to use the Buttercup? Why not?

so small on the Buttercup, that we cannot see them so well.

Let me see. Suppose we take the Lily, the beautiful white Lily. You have seen this flower. It is one of the queens of the garden. Even "Solomon, in all his glory, was not arrayed like one of these."

I think it would be a very good plan, for children to take a pencil, and draw the different pictures that are used in Botany. It

---

What flower shall we use? What will help children in learning to remember the different parts of plants?

would help them a good deal to remember the names of the different parts of flowers and leaves. Mr. Holbrook, of New York, has prepared a set of drawing cards for this purpose, and I like them very much.

Look now at the engraved picture of the Lily. You see there are six divisions, or leaves, as you would call them, which you know, in the living flower, are white.

Well, all these divisions together are what we call the *Corolla* of the Lily.

If you should turn back to the Buttercup, which we were talking about a moment ago, you could point out its corolla without any difficulty. That is yellow, and much smaller.

Most, though not all plants, have a corolla, and the other nine organs already mentioned.

The separate divisions of the corolla have also a name. Each one is called a *Petal.*

In the Lily, there are always six petals. The Buttercup has only five.

How many divisions are there in the flower of the Lily? What are they called in Botany? What is each separate division of the corolla called? How many petals are there in the Lily? How many in the Buttercup?

In the corolla of the Lily, you notice six little stems, with heads upon them, somewhat like a kernel of wheat.

These are the male organs of the flower. Each one, by itself, (I mean the stem and the head together,) is called a *Stamen*. The Buttercup has a good many stamens. The Lily has always six only.

The stem of the stamen alone, without its head, is called the *Filament*.

The filament of the Lily is long and slender. In some flowers it is much shorter, and some have none at all, but this little head sits on the bottom of the corolla.

The name of that little head on the top of the filament, is the *Anther*.

You can see the shape of it very plainly on the Lily. The Buttercup has so small an anther, that you can scarcely tell what its shape is with your naked eye, and this is one reason why I preferred to examine a Lily.

What are the six little stems, with their heads, called in the Lily? What can you say about the stamens of the Buttercup? What is the stem alone, without the head, called? What is the name of the head?

The anther in all plants is covered with fine dust. This dust is called the *Pollen.*

Look at the Lily again, and you observe one stem longer than the stamens, and a little larger. This is the female part of the flower. Botanists call it the *Pistil.*

The pistil has a head, as well as the stamen, though in the Lily it has a very different shape. This head is called in Botany the *Stigma.*

The pollen, or fine powder from the six anthers in the Lily, is scattered upon the stigma, and this produces the seed.

So it is in all plants which have blossoms, or corollas, and stamens and pistils. The pollen must fall on the stigma, to make the seed.

The stem of the pistil, or that part of it which looks like the filament of the stamen, is called the *Style.*

The bottom of the pistil is enlarged, and forms a knob, shaped a little like an egg.

You cannot see this knob in the Lily, unless

What is the name of the dust on the anther? What is the name of the stem a little larger than the stamens? What is its head called? What is the name of the stem, without the head? How is seed produced?

you take the flower apart. If you will do so carefully, you will find this little organ, and after the plant has been in flower some time, it contains the seeds. This organ is called the *Germ*.

Now do you see where the stem of the flower is joined to the corolla? The stem is flattened a little at that place, just at the roots of the petals. The end of this flower stem is the *Receptacle*.

◆

CHAPTER FIFTH.

I HAVE now shown you eleven of the organs which Botanists think every young learner should become acquainted with. I have told their names, so that I think you will remember them.

But you remind me that there is one organ which I have named, and have not pointed out. I know it. I have omitted the very first among

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What is the name of the knob, at the bottom of the pistil? What organ holds the seeds? What is the end of the flower stem called? How many organs have now been pointed out?

those which I said I wished to have you commit to memory. That is the Calyx.

I will tell you why I passed by it. The Lily, which we examined, has no such organ. It has a very pretty corolla, but it has no calyx. So, in order to show it to you, we shall have to get another plant engraved.

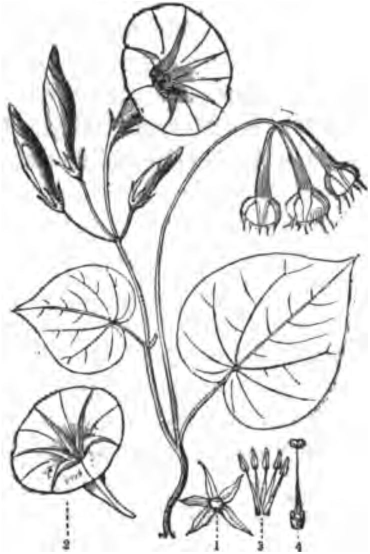
We will take the Morning Glory. That has the organ, and it is a beautiful flower, too.

How charming a group of them look, as they twine around the cord that some kind hand has prepared for them, and climb up to the windows, and unfold their delicate petals. Turn over a leaf, and you will have a fine picture of a Morning Glory.

Just under the corolla of the Morning Glory, you notice something like a cup, in which the neck of the flower is placed. It has five separate divisions, or teeth. This is what Botanists call the *Calyx.*

In different plants it has different shapes.

What is the name of the organ which has been passed by? Why was it passed by? Mention a plant which has this organ. What can you say about the Morning Glory? Point out the Calyx on the Morning Glory.



THE MORNING GLORY.

Some plants, as you perceive, that have a corolla, have no calyx.

I need not tell you whether there is one on the Buttercup or not, for you will see for yourself, when you look at it.

The calyx is generally of a green color, though not always.

I have *dissected* the Morning Glory, that is, taken it apart, so as to show its different organs more distinctly. In the engraving, I have shown these organs separately. They are marked with figures.

1. The Calyx. It is flattened out in the engraving, so that it does not look as it does when it is holding the corolla. You see it has five parts.

2. The Corolla. In the Morning Glory it is composed of one single petal.

3. The Stamen. There are five of them. When the flower is growing, they are in the

---

Is there one on the Buttercup? What is generally the color of the calyx? What do you mean by *dissecting* a plant? How many parts has the calyx in the Morning Glory? Can you point to the calyx, among the dissected parts in the engraving? The Corolla? The stamens?

throat of the corolla, so that they are not shown in the picture of the whole plant.

I suppose it is not necessary to tell you the name of the little head on the top of these stamens, is it ?

4. The Pistil. This is also hidden in the tube of the corolla, but here you see it just as it appears, when we dissect the flower.

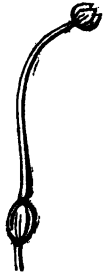
You may give the name of the top of the pistil; of the pillar which holds it up; and the little round organ at the base.

In the classifying of plants, Botanists have a great deal to do with stamens and pistils. On this account, you will not wonder if I wish to make you very familiar with them. So we will make a separate engraving of a stamen and a pistil, and you may look at each one by itself, and see how they differ. Here is a Stamen all alone. It is one that came from the Lily. You can

---

Can you point to the Pistil, and its different parts? What are so important in the study of Botany? What do you call this organ, standing alone? What flower does it belong to?

see the whole of it now. When it was in the picture of the flower, with the rest of the stamens, you could see only about half of it. The Lily has very long stamens. You must not expect to find them so long in all flowers.



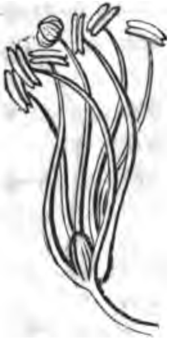
Here is a picture of a Pistil. This too belongs to the Lily. If you will look back a few pages, and find the Lily, you cannot help noticing that the pistil there looks like this. But you cannot see all of the pistil in the whole flower, because the corolla hides a part of it. Here is the whole pistil. Even the Germ is in sight. The germ, you know, is that roundish organ, which lies at the bottom of the style. The Style is the stem of the pistil, as you have been told. If I should ask you what the head of the pistil is called, you would say it is a Stigma.

You see there is a great difference between the stamen and the pistil of the Lily. So there

---

Are the stamens of the Lily long or short? What do you call the other organ, standing alone? You can see the germ here. Will you point it out? The style, too, and the stigma?

is in all flowers. You will not have much difficulty in telling them apart. You may generally know the stamen by its pollen. The pistil has no pollen.



I will now take up the Lily again, and strip off the corolla, so that every part of the stamens and pistils will be in sight at once, and so that you can see just how they look, when separated from the rest of the flower.

There are always six stamens and one pistil in the Lily. You can see them very plainly here. I have only taken off the corolla, and left the other parts of the flower standing just as they did when the whole plant was growing in the garden. You can see now how the germ grows at the bottom of the corolla.

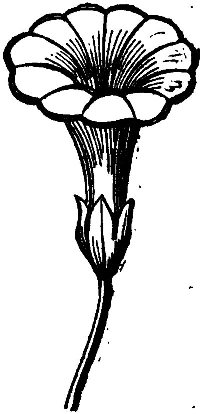
Perhaps you will wonder why I have said so much about stamens and pistils. I know I

Is there much difficulty in telling stamens and pistils apart? What is there on the anther that is not on the stigma? Now you may point out the different organs, and call them by name, on this whole picture.

have had a good deal to say about them. But there are no other organs of so much consequence in the study of Botany as these, as you will see by and by, when we come to arrange the plants in their classes and orders.

CHAPTER SIXTH.

If we examine a handful of different flowers, taken from the field or garden, we perceive at a glance that the corallas have many different shapes.



Each of these shapes Botanists have named; but I shall not trouble you with many of these names.

The shape of the corolla in this engraving is *funnel-form.* We have already examined a plant with such a corolla. The Morning

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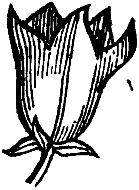
Have corollas many different shapes? Tell us something about these shapes.

Glory has a blossom which is called funnel-form.

So whenever you find a flower with this shape, you will know how to describe it.

Some of the necks of the flowers which are funnel-shaped, are so long and slender, that the bee cannot get down to the bottom of them, where the honey is. But when the humming-bird comes along, you will see him thrust his slender bill into it. You may be sure of it. And he will not be a great while about it, neither. His bill looks as if it was made on purpose for such flowers. What a beautiful sight it is, to look at the humming-bird, as he flutters around the flowers near the window.

The humming-bird must be a good Botanist, I think; for he examines a great many flowers in the course of a single summer.



Here is an engraving which is designed to represent another shape. Every flower in this form we call *bell-shaped.*

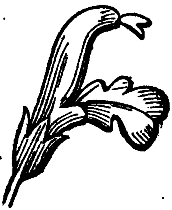
Botanists generally give it a

What is the shape of the Morning Glory? What is said about the bee? What is said about the humming-bird?

harder name; but this will do very well for us.

There is a beautiful plant which you will see in very wild places, often hanging from the cleft of high rocks. It has a delicate blue flower. That is bell-shaped. Indeed it is called the Bell Flower.

I have seen the sweet little thing, in all its beauty, on the tall cliffs of Montmorency, near Quebec, in Canada, and smiling as its delicate face was kissed by the spray from the thundering cataract.

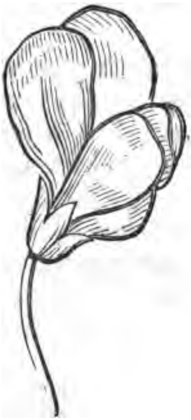


This picture represents a corolla which is *lip-shaped.* You see the divisions appear like two lips.

The Nettle, a very troublesome weed, has a corolla of this form.

So has the Verbena, a plant much admired in the garden, one species of which is very fragrant.

What is the shape of the Bell Flower? What flowers are said to be lip-shaped?



Here is a curious looking corolla. But there are a great many plants which have such, and some are very useful, too. They are called *butterfly-shaped.*

The Pea has such a blossom, you know. So has the Bean.

All plants, or nearly all, with flowers shaped in this manner, bear some kind of a pod, which encloses their seeds.

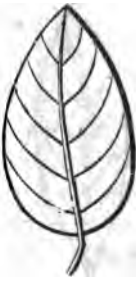
But we shall have more to say about this, when we come to the class to which most flowers of this shape belong. They are nearly all in one class.

What is the shape of the corolla of the Pea and the Bean? Are there many flowers that have such shapes?

CHAPTER SEVENTH.

Now shall I tell you something about the different kinds of *Leaves?* You have noticed, no doubt, what a great difference there is in the shape of leaves. Well, it is necessary to learn how to describe leaves as well as flowers.

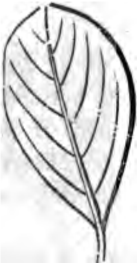
So we will look at some, and if we can tell how they look, without giving them any hard names, we will do so.



Here is a very common leaf. The common Plantain has such a leaf. So has the Apple-tree, only the leaf of the Apple-tree is notched on the edges. The one in the engraving has no notches on it.

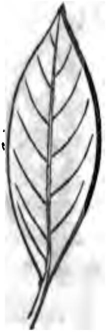
We will call this, if you please, *egg-shaped*, for Botanists generally call it by a word in Latin which means the same thing.

Have leaves many shapes? What is the shape of the common Plantain leaf? Mention another leaf of the same shape.



Sometimes leaves are egg-shaped, but the smaller end is fastened to the stem, instead of the larger end.

This is not so common, but some grow in this manner. Such leaves are *inversely egg-shaped.* Some forest trees have leaves like this.

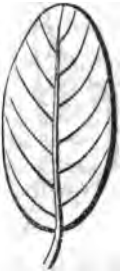


Some plants have leaves which are almost egg-shaped, but both ends are very nearly of the same width.

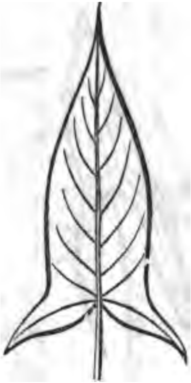
One of the species of the Magnolia tree, which grows wild in New Jersey, has such a leaf. The shape is called *oval.*

The Magnolia has a beautiful white flower, which is very fragrant. It grows in wet places, and we often have to wade for it.

What is meant by a leaf being inversely egg-shaped? What is an oval leaf?



Here is another leaf which is oval. It differs from the first, however. The two ends are broader and the upper end is not pointed. Both are oval, because the two ends in each are nearly of the same width. One of the species of Milkweed has this kind of oval leaf.



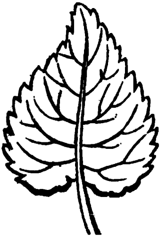
When a leaf is formed like the one in this picture, it is called *halberd-shaped.*

The lower leaves of the White Lettuce, in the garden, are examples of this shape.

I suppose you never saw a halberd. I never saw one myself, though I believe it is a kind of spear, formerly used in war.

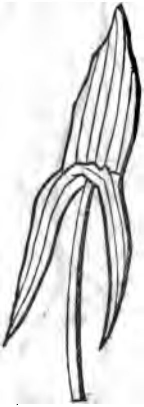
There is one species of the Knot-weed which has a halberd-shaped leaf. It grows in wet places. This is the leaf itself.

Can you tell anything about halberd-shaped leaves? What plant has leaves of this shape?



Did you ever notice a leaf like this? There is a very common, though not much admired plant, which has it.

Perhaps you can tell what it is. It has little round burs on it, which sometimes stick fast to our clothes, when we walk in the fall of the year.



It is the Burdock, and all such leaves as this plant has, are *heart-shaped.* I think, if you will look at the leaf of the Lilac, you will find that heart-shaped.

This is a picture of an *arrow-shaped* leaf. The Sorrel leaf is something like it, you know.

But one of the best examples of this shape, perhaps, is the plant called the Arrow-head. It grows in wet places, often on the edge of ponds and small

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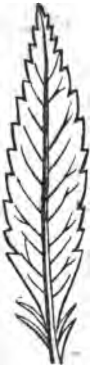
Are there any heart-shaped leaves? What plants have such? Tell us what you know about arrow-shaped leaves

streams, and bears a pretty white blossom. You will often find it where the beautiful White Pond Lily grows, though it does not like to have the water quite so deep as the Pond Lily does.

You have all seen the plant which grows around houses in the country, called the Plantain.

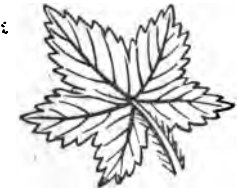
Well, this is not the leaf which is given in this engraving. But the common Plantain has a sister, which, perhaps, you have not noticed. It looks a little like it, but the leaf is not so wide, and is a great deal longer.

This is the kind of leaf which we call *lance-shaped*. You see it in the engraving. This is notched, to be sure, though the Plantain-leaf is not. But that makes no difference. Lance-shaped leaves sometimes have notches, and sometimes they have none.



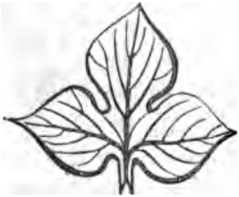
What plant has a lance-shaped leaf? Are lance-shaped leaves always notched on their edges?

CHAPTER EIGHTH.



I HAVE a great mind to take up another chapter with leaves. Here is a *hand-shaped* leaf. It looks like a hand you see.

I cannot think of many plants that have a leaf of this kind; the Passion-flower has such leaves, but it may be you never saw a Passion-flower. It is a house-plant, and very beautiful.



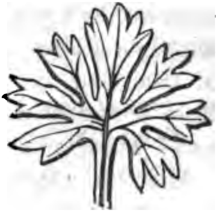
When leaves are cut into divisions like this, they are said to be *lobed.* These divisions are the *lobes* of the leaf.

One of the earliest wild flowers of Spring has a leaf which is divided into three lobes. The flower is blue, and its common name is Liver-leaf.

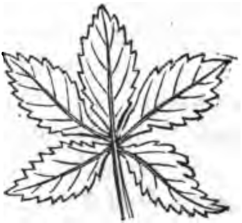
Some people call it *Liverwort,* though that

What plant has a hand-shaped leaf? What is a *lobe* in a leaf? What are leaves that have lobes called? Name something that is lobed.

is not its proper name. The Liverwort is quite another thing.

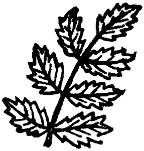


If you should ever fall in company with such a looking leaf as this, (and I cannot doubt you will,) you may call it *foot-shaped*. This is the meaning of the Latin name which has been given to it, though possibly you will wonder what animal there is that carries about such a queer-looking foot.

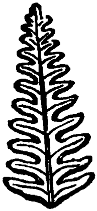


This is a *finger-shaped* leaf. It has five deep lobes. I remember several plants that have such leaves. But very likely you are not familiar with them, so it would do no good to call them by name. When you see such a leaf, however, you will know what to call it.

What can you say about foot-shaped and finger-shaped leaves?



You often see leaves growing opposite each other, like the arms on the human body, or the wings on a bird. There is one of this kind in the drawing. Rose leaves grow in this manner. They are *winged.*



Here is another leaf. I hardly know what we shall call this; but I promised you to avoid the Latin words as much as possible, because I know children love plain English. Let me see. We will call this leaf *lobe-winged.* I see you laugh at my "plain English," but I assure you I have done the best I could. The wild Peppergrass is an example of this leaf.

Leaves and flowers have a great many more shapes than those I have mentioned. I hope at some future time you will know them all. But you need not learn the names of any more now.

How do leaves look that are winged? What is the notched leaf of the Peppergrass called?

CHAPTER NINTH.

It is time for us to begin to analyze plants, and classify them.

I will suppose now that you have been walking with me in the forest and meadow, and that we have found and gathered a good many different plants.

We sit down to rest under the shadow of some tree, an oak tree, if you please. We have frightened away the ground-squirrel, who has come here to carry off the acorns. No matter. He will have time enough before winter, to lay up his cellar full of food.

Look at one of these acorns. It is a small thing, a very small thing, and yet this proud oak, with timber enough in it to build a vessel, was once a little acorn.

It came up out of the ground, and it grew, and grew, until it has

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What is said about the ground-squirrel? Has he much to do with Botany, do you think? What can you say about the acorn?

become the largest tree in the whole woods. No human mind can tell how it lifts its form toward heaven. Who made it grow? Who taught it to spread its arms so wide, and who gave it its strength?

My child, when we see such proofs of the wisdom and the power of God, how can we help saying in our hearts, "Great and marvellous are thy works, Lord God Almighty: all thy works praise thee!"

We must have proud and very hard hearts, if we can be familiar with Botany, and not be awed into reverence by God's greatness, and melted into love in view of his goodness.

But we must talk about the flowers you have collected.

Every plant in your hands is ranked under a class, an order, a genus, a species, and perhaps a variety. All the vegetable world is so divided.

The Violet in your hand, the Oak towering so high above your head, as well as the Moss

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What can you say about the oak tree? How should we feel toward Him who made the oak tree? How are all vegetables divided? Repeat the divisions.

the Fern, and the Mushroom, are all placed under some one of these different classes and orders.

Now a great part of the study of Botany consists in learning how to classify plants. So you will remember these great divisions.

1. Class,
2. Order,
3. Genus,
4. Species,
5. Variety.

In analyzing a plant, (as Botanists call the task of observing it, so as to know what it is,) you are first to find its class, then its order, then its genus, then its species, and if it has different varieties, its variety.

Generally, when you find the species of a plant, you have its name. Most species have not different varieties.

A variety is made usually by cultivation. Some garden flowers and fruit trees have a great many varieties.

What do you find in analyzing a plant? What next? What next? What next? What next? Have all species of plants different varieties? How are varieties usually formed?

The Dahlia, for instance, has several hundreds. So have the Apple, the Pear, and the Peach.

But wild flowers have not generally different varieties.

When we speak of more than one genus, we use the word *genera*. So we say the fifth class, for example, has a good many *genera* in it.

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CHAPTER TENTH.

There are two ways of classifying plants. One is called the *Natural System*—the other, the *Artificial System*.

The genera and the species, however, are the same in both. The difference is, that they do not begin alike.

In the natural system, plants are put into classes and orders, according to their seed

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Mention some plants that have several varieties. What word do we use when we speak of more than one genus? What two ways are there of classifying plants? What is the *natural* system?

organs—in the artificial system, according to the stamens and pistils.

Both these systems are good. I think, however, that the better for you, at present, is the artificial system.

The plan of classing plants in this way, was first thought of by *Linnæus*. He was a very learned man, and did a great deal of service to the world by writing about plants. He was born in Sweden, in 1707, and died in 1778.

In this system of Linnæus, it makes no difference whether plants look alike in other respects, or not; or whether they are large o small. If they agree in their stamens and pistils, they are arranged in the same class and order.

I remember a little flower, not higher than the length of your finger, that is classed with a pretty large tree.

On this account, some people do not like the system, at all. But I think it easier and better for you to begin with, than the other.

What is the *artificial* system? Which is the better for us now? Who first thought of the artificial system? When and where did he live?

Still, if you have any notion of being a Professor of Botany in College, I would recommend to you by all means to learn the natural system. But you need not be in a hurry yet about being a Professor.

You can now see why it is that I wanted you to pay so much attention to the stamens and pistils. These are the organs that are to guide us in finding out the class and order of every plant we meet with.

The system of Linnæus has been altered a little, and I shall explain it to you with the alterations that have been made.

CHAPTER ELEVENTH.

THERE are *twenty-one classes.* All these classes have different orders. Some have few, and some many.

The first question to be answered, when you take up a plant in its flowering season, to

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Why did we have so much to say a while ago about stamens and pistils? How many classes are there? What about the orders in their classes?

analyze it, is whether you can see any stamens and pistils on it with your naked eye.

If you cannot see any—if it has no stamens and pistils—then the plant, whatever its name may be, belongs to the twenty-first class.

If you can see its stamens and pistils, then it belongs to some one of the other classes.

In the first ten classes, we tell the class by the number of the stamens, and the order by the number of pistils.

The name of the class is just the same as the number of the stamens; and the name of the order is the same as the number of the pistils.

If the flower has one stamen, then it belongs to the first class.

If it has two stamens, it belongs to the second class.

If it has three stamens, it belongs to the third class.

What is the first question to be asked, when you take up a flower to analyze it? What then? What if a plant has stamens and pistils? In the first ten classes, how do we tell the class? How the order? If a flower has one stamen, what class is it in? Two? Three?

If it has four stamens, it belongs to the fourth class.

If it has five stamens, it belongs to the fifth class.

If it has six stamens, it belongs to the sixth class.

If it has seven stamens, it belongs to the seventh class.

If it has eight stamens, it belongs to the eighth class.

If it has nine stamens, it belongs to the ninth class.

If it has ten stamens, it belongs to the tenth class.

There is one thing to be noticed, however, about two of these classes. I mean the fourth class and the sixth class. If you find any flowers with four stamens, and two of them are longer than the other two, then the flower does not belong to the fourth class.

And so, if you should find that a flower had six stamens, four of them longer than the other two, you must not put it into the sixth

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If a flower has four stamens, what class is it in? Five? Six? Seven? Eight? Nine? Ten?

class, with the rest of the flowers that have six stamens.

Flowers of four or six stamens, must then have their stamens of nearly or quite the same length, or they do not belong to the fourth or sixth class.

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CHAPTER TWELFTH.

Now you perceive that it is very easy to tell any of the first ten classes. Well, it is just as easy to tell the orders into which these classes are divided.

When you have found that a flower belongs to any one of these first ten classes, then,

If it has one pistil, it belongs to the first order.

If it has two pistils, it belongs to the second order.

If it has three pistils, it belongs to the third order.

What have you to say about the flowers with four and six stamens? Suppose, now, a flower belongs to any one of the first ten classes. Then, if it has one pistil, what order is it in? Two? Three?

If it has four pistils, it belongs to the fourth order.

If it has five pistils, it belongs to the fifth order.

If it has six pistils, it belongs to the sixth order.

If it has seven pistils, it belongs to the seventh order.

If it has eight pistils, it belongs to the eighth order.

If it has nine pistils, it belongs to the ninth order.

If it has ten pistils, it belongs to the tenth order.

But we will talk no more about orders, until we get through with the remaining classes.

This rule about the number of stamens being the same with the name of the class, does not go beyond the tenth class. The remaining ones are formed differently.

If a flower has more than ten stamens, and

If it has four pistils, what order is it in? Five? Six? Seven? Eight? Nine? Ten? In forming classes according to the number of stamens, do we go any further than ten stamens?

they grow out of the calyx, it belongs to the eleventh class.

If it has more than ten stamens, growing out of the receptacle, or head of the flower stalk, it belongs to the twelfth class.

If a plant has four stamens, two long and two short, it belongs to the thirteenth class.

If it has six stamens, four long and two short, it belongs to the fourteenth class.

If a plant has stamens joined together by its filaments, in one bundle, it belongs to the fifteenth class.

If its stamens are joined together, by their filaments, in two bundles, it belongs to the sixteenth class.

If the stamens of a plant are joined together by their anthers, instead of their filaments, it belongs to the seventeenth class.

If its stamens grow out of the pistil, it belongs to the eighteenth class.

If the stamens only are on one corolla, and the pistils only on another corolla of the same

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How do you know the eleventh class? Describe the twelfth class. The thirteenth. The fourteenth. The fifteenth. The sixteenth. The seventeenth. The eighteenth.

plant, then the plant belongs to the nineteenth class.

If the stamens only are on one plant, and the pistils only on another plant, the flower belongs to the twentieth class.

If the stamens and pistils of a plant cannot be seen, when it is carefully examined, and you are satisfied that it has none, it belongs to the twenty-first class.

I have already told you how we make the orders in the first ten classes. The orders in the eleventh and twelfth classes are formed in the same way.

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CHAPTER THIRTEENTH.

You will wish to know something about the orders in the remaining nine classes.

The thirteenth class has only two orders.

Plants belonging to this class, which have

Describe the nineteenth class. The twentieth. The twenty-first. How are the orders in the eleventh and twelfth classes formed? How many orders in the thirteenth class?

very few seeds, lying naked in the bottom of the calyx, are of the first order.

Those which have a good many seeds, all covered in some kind of vessel, belong to the second order.

In the fourteenth class, there are also but two orders.

The first order has its fruit or seed in a roundish pod.

The second order has its fruit or seed in a long pod.

In the fifteenth and sixteenth classes, we make the orders according to the number of the stamens; that is, if the plant is in either of these classes, we count the stamens, to tell what order it belongs to. But the number of the stamens is not always the same as the number of the order. That is, if it has three stamens, it does not belong to the third order; and if it has four stamens, it does not belong to the fourth order.

How do you know the orders in the thirteenth class? How many orders are there in the fourteenth class? How do you tell these orders apart? How do we make the orders in the fifteenth and sixteenth classes?

I will tell you how the orders are numbered in the fifteenth class.

The first order has three stamens.

The second order has five stamens.

The third order has seven stamens.

The fourth order has eight stamens.

The fifth order has ten stamens.

The sixth order has more than ten stamens.

In the sixteenth class,

The first order has five stamens.

The second order has six stamens.

The third order has eight stamens.

The fourth order has ten stamens.

In the seventeenth class, there are five orders. I cannot teach you how you may tell these orders apart, until you understand what is meant by a *floret.*

Flowers in this class are *compound,* that is, they are composed of several little parts, which are themselves very much like separate

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What are the orders of the fifteenth class? What are those of the sixteenth? How many orders in the seventeenth class? What do you mean by a *compound flower?* Are the plants in this class usually compound?

flowers. They may have a corolla, a calyx, and even stamens and pistils, of their own.

These little flowers within the whole flower, are called florets.

Now, if a plant belongs to the seventeenth class, and each floret has a stamen, a pistil, and one seed, then it should be placed under the first order. Such plants are called *perfect.*

If the florets of the centre of the whole flower or head are perfect, and the florets of the margin or outside have only pistils, the plant belongs to the second order. These florets on the outside, are called *superfluous,* because they have no stamens in company with their pistils.

Compound flowers, with their centre florets perfect, and the florets of the margin without either stamens or pistils, belong to the third order.

Those that have stamens on the centre florets, and pistils on the outside ones, belong to the fourth order.

Compound flowers, with florets separated

What do you mean by a *floret?* Describe the first order in the seventeenth class. The second. The third. The fourth. The fifth.

from each other by a calyx of their own, are placed in the fifth order.

The orders of the eighteenth, nineteenth, and twentieth classes, are formed by the number of stamens, just as they are in the fifteenth and sixteenth classes.

There are six orders in the twenty-first class. Perhaps you will think there is so little beauty in the plants belonging to this class, that you will not be paid for examining them. But when you come to notice them carefully, you will not think so.

The first order of the twenty-first class includes the *Ferns.*

The second contains the *Mosses.*

The third contains the *Liverworts.* You will see them growing on the stones inside of old wells.

The fourth contains the *Sea-weeds.*

The fifth contains the *Lichens,* growing on bark of trees, old walls, and dry wood.

How do you form the orders in the eighteenth, nineteenth, and twentieth classes? How many orders in the twenty-first class? What does the first order contain? The second? The third? The fourth? The fifth? The sixth?

The sixth, the *Mushrooms*, or *toad-stools*, as they are called.

CHAPTER FOURTEENTH.

When we have learned the class and order of a plant, the next thing is to find out its genus and species; and then we know what its name is.

This book is so small, that I cannot tell you everything about Botany, and I should not wonder if you was so small, that you could not learn everything about Botany, if I should put it in my book. So there are two very good reasons why I should leave some things for another time.

Another time! How little do we know what we shall do at another time! Perhaps I shall not live to make another book. Perhaps, too, my little friends will not like this book very well. So I can only say, if this one pleases you, I hope to be able to make a larger one for you.

After we have found the class and order of a plant, what is the next thing?

I wish now to teach you to find the class and order of all the flowers you meet with. If you are able to do this, you will have learned a good deal.

In this book I cannot tell you so much about the way to find the genera and species of plants, though I mean to tell you something.

Suppose now, you know the class and order of a flower you have in your hand. Suppose it is the Lily.

It is of the sixth class, because it has six stamens, all of the same length.

It is of the first order, because it has one pistil.

Well now, what genus, or family, does it belong to, and what is its species?

There are books printed, which take the classes and orders separately, and describe all the flowers that belong to each. They take up the first class, and tell us a good deal about the plants that belong there.

They are very particular. They tell us about the corolla, and the calyx, and the sta-

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Tell us a little about finding the genus and species of a plant. Show how you would proceed with the Lily, if you was analyzing it.

mens, of each plant in that class, so that, when we have a plant with one stamen, and know that it belongs to the first class, and know its order, too, we can easily find out the genus, when we see it described with the rest of the genera in the first class.

So the book tells us very particularly about all the flowers in the rest of the classes, going on regularly, up to the twenty-first class.

By this description of genera, we learn the genus of any plant. Then the student must turn to another part of the book, where the names of all the different species of plants are.

These species are arranged under the genera to which they belong; and all the genera are put down like the words in a dictionary. Those beginning with A, come first. Then those beginning with B, C, and so on.

So when you know the genus of a plant, you turn to the page where the genus is put down according to its place in the alphabet, and there you will find what species it belongs to.

How are genera arranged in books that describe plants? How are species put down? Is the genus or the species found by its place in the alphabet?

I need not tell you that it would take the whole of a book much larger than mine, to describe all these genera and species.

I suppose you have no such book as this now before you, and if you had, you would find many hard words in these descriptions, which you could not understand.

But I will take up the Lily, and trace out its genus and species, and show you how you would find its name, if you did not know, and if I had prepared for you such a work as the one I have just mentioned.

◆

CHAPTER FIFTEENTH.

The Lily belongs to the sixth class and first order, does it not? Well, if I had given you a description of plants, you would look at the genera under the sixth class and first order.

There I should tell you about some plants with a calyx, for this class has a great many flowers with calyxes.

But you need not expect to find the Lily in

What class does the Lily belong to? How would you find its genus in a book describing different plants?

any such genus. The Lily, you know, has no calyx.

You might go through half a dozen genera, before you came to the right one. Some would be very different from the Lily. Some would be very much like it, but not in every respect.

So you would pass on, till you came to a genus where the the Lily was described.

The description, if I had made it for little children, would be like this:

"*Lilium.*—Corolla with six spreading petals; petals growing out from below the germ; each one with a line running up and down from the middle to the bottom; stamens shorter than the pistil; stigma not divided; after the corolla has fallen off, seed vessel somewhat three-cornered, with the partitions joined together, and crossing like the wires in a sieve."

This would describe the Lily, so that you would see that you had found it, if you was looking for its genus.

But then, you would only have the genus of

How would you find the species after you had the genus?

your plant. There are several different species of the *Lilium*, or Lily.

So, to get the species, you would look for L, in the list of species, and find *Lilium*.

You might pass by half a dozen species before you came to the right one; but when you found it, the description of it would be like this:

" *Candidum.*—Leaves lance-shaped, scattering, growing smaller towards the lower end; corolla bell-form, inside very smooth; growing in gardens."

So then you would have the *Lilium Candidum*, which is the Latin name for *White Lily*.

That is the way that every plant is analyzed. First, you find its class, then its order, then its genus, and then its species.

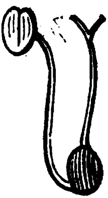
But before you try to find the name of any flower in this way, I want you to be very familiar with the classes and orders; and now, I think we might as well talk a little about all the classes, taking them up according to their numbers, from one to twenty-one.

What is it necessary to know very well before we try to find the genus and species of plants by analyzing them?

s I mention these classes, one by one, I ant you should see if you cannot remember the rules you have been learning about the classes, and if you cannot, then you should read them over again.

I mean to give you a picture now, with each class. This will help you remember what I want you to learn, so that if I should show you any flower that you had never seen before, you might be able to find its class and order.

FIRST CLASS.



There are but very few flowers belonging to the first class in this country, though in warm climates there are many, and some that are quite valuable.

The Samphire is one of the plants belonging to this class, which grows in our own country. I have seen it on the shores of Long Island Sound, generally in places that are overflowed with

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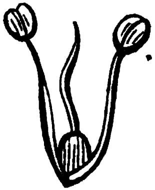
What is said of the first class? Has it many plants? Mention one.

water at high tide. It is a fleshy plant, and people sometimes make pickles of it, for eating.

The Samphire belongs to the first order. I suppose you can tell why. It has one pistil.

SECOND CLASS.



There are a number of plants which are very pretty in this class.

One you are well acquainted with, I am sure. I mean the Lilac. This shrub flowers very early in the Spring, and its blossoms are very fragrant.

The Lilac belongs to the first order, as you will see, when you examine its corolla.

There is another plant in this class that is quite common, but it is so small, that a great many walk over it without noticing it.

But that is no sure sign it is not worth noticing. I know some modest boys and girls, that are not as likely to be seen as some others,

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What is the order of the Samphire? What is said of the second class? What flowers can you mention in these classes? What of them?

but I think just as much of them, and a great deal more than I do of some that make more show.

This little modest flower is called the Veronica, or Speedwell. It has a light-blue blossom, and appears in the month of May.

THIRD CLASS.

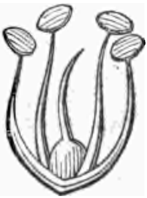
Did you ever see the Blue Flag, that grows in gardens? Sometimes it is called the Flower de Luce, but I think that a very poor name for it. This plant belongs to the third class, and as it has but one pistil, to the first order.

Here, too, are Wheat, Barley, Rye and Oats. So you see the plants of the third class are quite useful, though they may not be so handsome as some others. Beauty is a very good thing, but sometimes we meet with good things, without much beauty in them. Once in a while, too, we find a thing which is pretty enough, and that is all there is good about it.

What can you say about the third class? Are the plants in it generally beautiful, or useful, or both?

CHAPTER SEVENTEENTH.

FOURTH CLASS.



Among the plants belonging to this class, is the Dogwood. It has several species. One of them is a very pretty shade-tree. Its corolla is white, and its petals large and showy. You will see it in the woods, in flower about the first of May.

The common Plantain, too, which grows in your door-yard, belongs to this class. I have talked about it before. You have, no doubt, often noticed it in the path, as you were walking. It does not seem to care whether it is trod upon or not. How many times, when I was a child, have I gathered the long, slender rods of the Plantain, to play with.

There is a plant belonging to this class, which has something very curious about it.

Some years ago, when I was roving in the

What plants are mentioned as being in the fourth class? Tell what is said of them. What is the name of the curious shrub that belongs here?

woods, after the frost had come, in the month of November, I discovered a bush with flowers on it. I thought it very strange, for any plant to be in flower at this season of the year. I took it home with me, and analyzed it, for I then knew something about Botany; and I found by my book that this was the proper season for it to blossom.

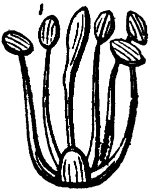
It was a shrub belonging to the fourth class and second order. It puts out flowers in the autumn, and waits till spring before it bears fruit.

I don't know what it has to do with witches, I am sure. But they call it Witch Hazel.

If you had a flower of the Spearmint or Peppermint in your hand, you would perhaps say "this flower belongs to the fourth class." But take care. Look at it a little, and you will see that though it has four stamens, they are not all of the same length. You see two are long, and two short. So it must belong to another class. Can you tell which?

What is there curious about it? Do the Spearmint and Peppermint have four stamens? Do they not belong to the fourth class, then? Why not?

FIFTH CLASS.



This is by far the largest of the classes of Linnæus. It contains more than a quarter of all the plants that have stamens and pistils which can be seen with the naked eye. Many of our most beautiful flowers and most useful vegetables, have five stamens.

You remember the Morning Glory, which we talked about a little while ago. That belongs to the fifth class. I will not tell you the order. But when you see it again, you may notice how many pistils it has, and you can tell as well as I can.

The Violet belongs in this class. There are a number of species of this sweet, modest flower. Several of them can be found in the forest and the meadow, in the month of May.

Miss H. F. Gould, who writes most beautiful

Is the fifth class large or small? What proportion of all the plants with stamens and pistils belong to this class? Mention some flowers that belong to this class. What have you to say about the Violet? Who has made a pretty fable about the child and the Violet?

poetry for children, has given us a fable about a little child and the wild Blue Violet.

The child says,

"Violet, violet, sparkling with dew,
Down in the meadow-land, wild where you grew,
How did you come by the beautiful blue
With which your soft petals unfold?
And how do you hold up your tender, young head,
When rude, sweeping winds rush along o'er your bed,
And dark, gloomy clouds, ranging over you, shed
Their waters so heavy and cold?

"No one has nursed you, or watched you an hour,
Or found you a place in the garden or bower;
And they cannot yield me so lovely a flower
As here I have found at my feet!
Speak, my sweet violet! answer and tell
How you have grown up and flourished so well,
And look so contented, where lonely you dwell,
And we thus by accident meet!"

The Violet tells the child how it is able to hold up its head, and where its pretty blue petals came from. My little friends, I am sure, do not need to go to school to the wild

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Do you remember the fable about the Violet and the child?

flowers, to learn who takes care of them, and who gives them their beautiful dress.

The Potato belongs to this class. So does the Tomato. These are in the same genus. They are both very useful.

There is one plant in this class, which is quite common, but it is no favorite of mine. Its leaves are dried, and used in several ways. Their taste is very bad, and it is said there are only two animals that will eat them. One of these animals is a frightful-looking green worm—the other belongs to the species called Man. The plant, I mean, is called Tobacco.

The Coffee Plant belongs to this class. This is a very important plant. As you have never seen one growing, and perhaps never will see one, I will give you an engraving of it. Here it is. It is a native of Arabia. It does not grow in this country. After its flowers have fallen, it bears a round berry, which comes apart when it is ripe. The coffee

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Mention some of the useful vegetables. What have you to say of one that is not very useful? What two animals are fond of it? What do you know of the Coffee Plant?

which we use, is the berry split in two pieces. The Coffee plant has one pistil. What is its order?

There are a great many plants which flower in the form of an *umbel.* You do not know what an umbel is; so I will tell you. Any plant that has flowers in a head, looking something like an umbrella, is said to have its flowers in umbels. So are the flowers of the

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What is an *umbel?* Mention some plants that flower in the form of an umbel? To what class do such flowers generally belong? What order do they belong to?

Caraway and Dill. Plants with umbels belong to this class. They have two pistils, and of course are of the second order.

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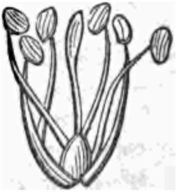
CHAPTER EIGHTEENTH.

SIXTH CLASS.

The Lily, you will remember, belongs to this class.



The Tulip is a little like it. The Tulip came from Persia. The species which grows in our gardens is a very gay and showy flower; but it is not so pretty as many that are more humble. Do you think it is?

When it was first brought into Europe, I have heard that the people thought so much of it, that they gave very high prices for it.

What pretty flowers are there in the sixth class? Tell what is said of them. Where did the Tulip first come from to Europe? What was thought of it there at first?

It set men as crazy as one variety of the White Mulberry did a few years ago.

Some roots of the Tulip sold as high as two thousand dollars; and in one instance ten thousand dollars were paid for a single Tulip root!

Many people gave all the property they had for a few Tulips. They thought they might make a great deal of money, by raising the flower to sell.

Some did make money, of course. But by and by, the price of the Tulip began to fall, and then hundreds of men became poor by their foolish trade.

So much for "making haste to be rich." It is bad business. The best way to get money is to earn it by honest and patient industry, just as the bee toils among the flowers of the meadow, to lay up her store of honey for the winter.

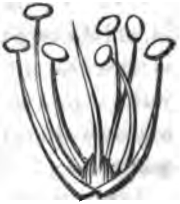
I remember a pretty little verse about the bee, which I learned at school, when I was a child:

What is said about people wishing to get rich too soon?

"How doth the little busy bee
Improve each shining hour:
She gathers honey all the day,
From every opening flower."

The Mustard blossom has six stamens. But you must not put it in the sixth class, because four of its stamens are longer than the other two. You will find a good many other plants, which have six stamens, but Botanists do not allow them to come into the sixth class. Can you tell me what class they must take?

SEVENTH CLASS.



There are not many plants with just seven stamens. I know one that grows in the woods. It is small, but very pretty. It is called the Chick Wintergreen.

You will know it, if I tell you two or three things about. It is a slender

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Does the Mustard plant belong to the sixth class? Why? Are there many plants in the seventh class? Can you mention any? and what of them?

plant, not more than five or six inches high. Near the top, are six or seven lance-shaped leaves, arranged around the stem something like a wheel. The corolla is of a delicate white color.

It flowers in the month of June, and the most likely place to find it, is among the dry leaves in the woods.

It is an old friend of mine; and you know we are apt to love our old friends the most. At any rate, I would go a good ways to-day, and climb, I don't know how many fences, to say nothing about getting my hands scratched with briars, if I knew I could see the sweet face of that companion of my childhood, the Chick Wintergreen.

I have it in my *Herbarium*, or collection of dried plants, and if my little friends were with me now, I would show it to them. But it is not so beautiful in the *Herbarium*, as it is growing in the forest. Its leaves have withered. Its delicate blossom has faded.

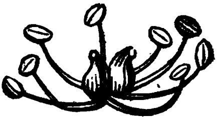
How very different it looks, as it lifts its

What can you tell us of the Chick Wintergreen? What is a *herbarium?*

head above the carpet of green moss where it grows, nodding gracefully to the little boy, who perhaps does not notice it in his rambles.

CHAPTER NINETEENTH.

EIGHTH CLASS.



In the middle of summer, you will see a plant, sometimes growing wild, and sometimes in the garden, called the Evening Primrose. This is one of the plants having eight stamens, and belonging to the eighth class.

It has large yellow blossoms. The corolla opens about sunset, and is closed during the day.

I have stood by its side, just as the sun was hiding himself behind the hills, and seen these flowers, one by one, unfold themselves, and

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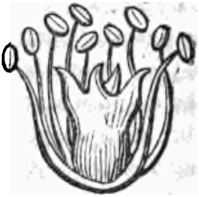
Tell us a little about the flowers in the eighth class.

spread out their petals to drink the dew of the evening.

Will you notice the pistils in the Evening Primrose, when you see it again, and tell your teacher in Botany what order it belongs to?

NINTH CLASS.



Now we come to the ninth class. Let me see. What common flowers are here? You could find some, I have no doubt, if you should set yourself about it.

You have only to count the stamens, and when you find a plant with nine, just nine, then you have what we want now.

I think, however, you will not find a great many different species with nine stamens, for this very good reason, that there are not many to be found. Plants do not seem to like the number of seven and nine; and it is not a very

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Are there many flowers in the ninth class? What two numbers do flowers seem not to like?

common thing to see them with either stamens or petals in companies of sevens and nines.

I do not think of many plants with nine stamens, that grow in this country. The Sassafras, that you know very well, belongs to the ninth class.

The Rhubarb, or Pie plant, belongs here, too. It is a foreigner. It came from another country. The Pie plant grows in the garden, and is very useful. Our mothers make pies of the stems in the spring of the year, and the doctors make a bitter dose of the root, to cure us, I suppose, when we eat too much of the pie.

The same bitter medicine cures laziness, too. At any rate, I know it cured that disease once. I will tell you the story. You will learn a good lesson from it, though I confess you might hear a great many such stories, and not learn much about Botany.

When I was a little boy, my father took me into the garden, one day, to pull up the weeds.

What have you to say about any flowers in the ninth class? Can you tell a story about one of them, that has not much to do with Botany?

It was a very warm day, and I did not like my work. I wanted to go into the house. So I told my father that I had the headache. I did very wrong, I know, for the only sickness I had was laziness, and my father knew it. He told me he was sorry I was sick, but that sick boys must not work, of course. "Go into the house," said he, "and tell your mother that I say you must take a good large dose of Rhubarb." I had to take the medicine, though I would rather have pulled up weeds a whole week. But it cured me. I was not troubled with laziness for a long time after that. I thought, too, while I was taking the bitter Rhubarb, that the truth was a great deal better than a lie.

Will you try to find out what is meant by the saying, that "Honesty is the best policy?"

CHAPTER TWENTIETH.

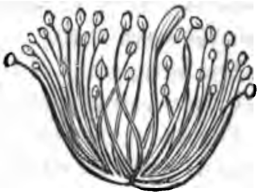
TENTH CLASS.

One of the most admired flowers in this class is the Garden Pink. I need not say anything in its praise. Every body loves the Pink. You will see it in the summer. Then you may count the pistils, and learn what order it belongs to.

One very curious and pretty plant in this class is the Laurel. It is a bush growing in the woods. It has a corolla shaped like a saucer, and in the sides of it, when it first opens, the little anthers are hidden in separate rooms. By and by, the filaments are bent a little, and draw these anthers out. Then they fly up suddenly, and scatter the pollen upon the top of the pistil, and so the seed is formed.

What pretty flowers can you mention that are in the tenth class? What is there remarkable about one of them?

ELEVENTH CLASS.



We have now come to a class which is not told by the number of its stamens; and beyond this class, up to the twenty-first, there are no more that you can find out by counting the stamens. You recollect it is only the first ten classes that are named according to the number of their stamens.

Now we must have something else to guide us. Do you remember what has been said about the eleventh class? It has more than ten stamens, and they must grow out of the calyx, you say. Well. Now for some plants that have a good many stamens. How is it with the Larkspur, that large blue flower in the garden? Let us look at it. I believe it

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Let us see what you know about the eleventh class. If a plant has eleven stamens, would you put it in the eleventh class? What rule have you, then, about forming this class? Must the stamens grow from the calyx or the receptacle?

has stamens enough for the eleventh class. It has more than ten, I am sure. But stop a moment. We are too fast. The Larkspur's stamens all grow out of the receptacle. So good bye, Miss Larkspur. We do not want you just now.

The Rose will do better. It has more than ten stamens, and they grow from the calyx.

There is a sweet verse of poetry that some one has written about the Rose, which I often think of, when I look upon the flower. I will repeat it.

> "Traced is God's name, in delicate lines,
> On flower and leaf, as they dress the stem;
> His care is seen, and his wisdom shines,
> In even the thorn that is guarding them.
> Now while the Rose, that has burst her cup,
> Opens her heart, and freely throws
> To me her odors, I offer up
> Thanks to the Being who made the Rose."

This class is as famous, too, for its good

How many stamens has the Larkspur? Why not put it in this class? What very beautiful flower does belong here? Can you give any account of what is said about this flower in the verse of poetry?

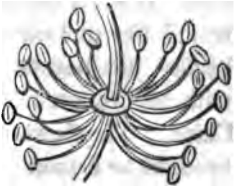
fruit, as for its fine flowers. If you will watch the blossoms of the Apple-tree in summer, I think you will tell me in the winter, when we are eating the apples, that they belong to the eleventh class.

And the Strawberry, which you love so well, belongs here, too. Watch the blossoms in the month of May, and you will see that they are fastened to the calyx.

CHAPTER TWENTY-FIRST.

TWELFTH CLASS.

We need not go a great way from home, to find some flowers of the twelfth class, because there are several garden flowers which belong here. The Larkspur I have already mentioned. We came very near mistaking it for a plant belonging to



What fruit trees belong to the eleventh class? What delicious fruit is there here that does not grow on a tree? Describe the twelfth class.

the eleventh class, you know. But its stamens grow from the receptacle, so it must go into the twelfth class.

Did you ever see the White Pond Lily? It is one of the most beautiful flowers that grow wild in this country. You may find it in ponds. The stem comes from a root at the bottom of the pond, and it has one flower only, which lies on the surface of the water. Its corolla is pure white. I scarcely ever saw a lovelier flower. It is fragrant, too, and a handful of them will fill a whole room with their sweet odor.

The Tea Plant belongs to the twelfth class. I never saw one growing, and never expect to see one. But I have seen a picture of the tree. It is on the next page. I thought you would like to look at it, not on account of its beauty, but because we have so much to do with its leaves. This shrub is a native of China. The flowers are white. It was first brought to Europe in 1666, and then none but

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What beautiful flower can you mention in this class? Where does it grow? What useful tree belongs here?

the richest people could use it, because it was so costly. But now, I need not say, tea-drinking is very common. So I suppose it will not

do to say that tea is not good to drink. Still I think you will say that pure cold water is better.

They had a queer sort of tea-party once in Boston. It was in the time of the first war between our country and England. If you

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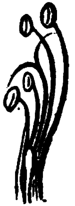
What can you tell about a Boston tea-party?

never heard the story about it, you must get your father or mother to tell it to you, for I cannot spare any more room for Tea in my book.

THIRTEENTH CLASS.

In the thirteenth class are plants with four stamens, two long and two short.

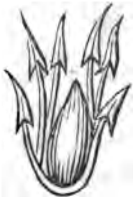


Very many of the plants in this class have lip-shaped corollas. The Mint family, you know, have such flowers, and they belong to this class. I believe I have already told you that the Spearmint and Peppermint belong here.

What is the shape usually of the corollas in the thirteenth class? What else can you remember about it? What plants belong to it?

CHAPTER TWENTY-SECOND.

FOURTEENTH CLASS.



Here we have the plants with six stamens, four long and two short. A very common form for the corollas in this class is the form of a cross. That is, there are four petals spread out flat like a cross.

There are a number of garden vegetables in this class. Their flowers are generally not very pretty; but the vegetable is in some way useful enough to make up what it lacks in beauty. Here we find the Radish, the Cabbage, and the Mustard. Can you remember how we tell the different orders in this class apart?

FIFTEENTH CLASS.

Plants that have the filaments of their flowers joined together at the bottom in one

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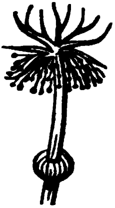
What is said about the fourteenth class? What is the common shape of the corollas of the plants belonging here? Mention some plants in this class.

bundle around the pistil belong to the fifteenth class.



The Geraniums, a large tribe of house plants, or most of them, at least, belong to this class. They have seven stamens. You know the orders in the different classes are formed from the number of the stamens. Those that have seven stamens belong to the third order. The Geraniums, then, or those plants which we usually call Geraniums, must belong to the third order.

There is a separate genus that has the name of Geranium. This genus has ten stamens. So it must belong to the fifth order. Must it not? There is one species of this plant, which grows wild in this country. You will find it in shady places, generally in, or near a forest. It has a beautiful purple blossom, and flowers in May and June.

How do you know the fifteenth class? What tribe of house plants is there in it? How many stamens has the house Geranium? What is its order? How many stamens has the separate genus called by the same name? What is its order, then? What can you recollect about one species of this genus, that grows wild?

The Passion Flower belongs here. I have had one species of it engraved for you. Here it is. You have seen it, perhaps. It is called the Blue Passion Flower. It is not a native of this country. But it is cultivated in the house in pots. It is a climbing plant, and if you will give it a ladder long enough, it will run a very great distance. There are several species of it. The anthers of the Passion Flower are fixed to the filaments in such a way that some people have supposed the sta-

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What curious flower belongs here? How is it curious? What gave it its name?

mens and the pistil together to look like the cross on which our Saviour was crucified. They have thought, too, that they could see in the top of the flower a likeness to the crown which he wore. That is the reason such a name has been given to it. *Passion*, many years ago, meant *pain* or *suffering*. So the plant was called the Passion Flower, because it looks like the cross on which Christ suffered, or felt his dying passion.

But I hope my young friends do not need to be reminded by the Passion Flower, that Christ has died for us. I hope they often think of his death, and often pray that they may love Him who first loved us, and gave his Son to die for us.

The Cotton Plant belongs to the fifteenth class. It has more than ten stamens. So it belongs to the sixth order.

Most of you have not seen the Cotton Plant growing. But here is a drawing of one species of it on the opposite page. I need not tell you that it is a very useful plant. We

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What very useful Southern plant is in this class? Describe it.

THE COTTON PLANT.

can hardly tell now how we should get along without it, it seems so necessary for our clothing. How thankful should we be that God provides so many things for our comfort. The Cotton Plant grows in the Southern States. It is very handsome. The flower has five petals, of a pale yellow color, with a little purple spot near the bottom. Its leaves are lance-shaped.

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CHAPTER TWENTY-THIRD.

SIXTEENTH CLASS.

As you have already been told, plants that have flowers with filaments tied together at the bottom in two bundles, belong to the sixteenth class. There is one other thing about this class, which will help you in telling what flowers belong to it. The corollas of nearly all the plants are butterfly-shaped. You remember I have given you a picture of this shape. When you

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How do you know the sixteenth class? What is the shape of the corollas of plants in this class?

see a flower with such a corolla, it will be safe generally to place it in the sixteenth class, without first noticing the stamens. But sometimes you may be mistaken.

There is one flower I think of at this moment, and a pretty one, too, which has a butterfly-shaped corolla and ten stamens. But Botanists have not put it into this class, because the filaments are not joined together, either in two bundles, or one. So it is put into the tenth class. The flower I am thinking of is the Sensitive Plant.

The Pea and Bean belong to the sixteenth class. And I may here say, that plants with butterfly-shaped corollas almost always have their seeds in some kind of a pod. So you have another thing to mark most of the plants in the sixteenth class. After the flower has fallen off, they bear a pod. This pod is different in different plants. The Bean, you know, has a different one from the Pea.

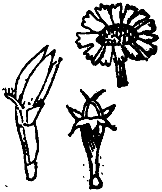
Both these vegetables have ten stamens.

What is the name of one that has such a shape and ten stamens, but does not belong to this class? Why not? How does the seed generally grow on the plants in this class? How are the orders formed in this class?

In this class the orders are formed from the number of stamens. Those that have ten stamens, belong to the fourth order.

SEVENTEENTH CLASS.

This is a very large class. It contains a great many plants. I think that in the fall of the year, there are more flowers in the fields belonging to this class than there are, at that season, in all the other classes together.



This class, we have seen, is marked by its having five anthers joined together, and its flowers being compound. Do not forget that the stamens must be bound together by their *anthers*, not by their *filaments*, and that the flowers must be *compound*. Can you remember what a compound flower is? It has several florets, you say. But what is a floret? You cannot

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Are there many plants in the seventeenth class? How do you know this class? Are the stamens joined by their anthers or filaments? Point to a floret in the picture.

very easily mistake the flowers in this class. They always grow in some kind of a head, formed of a number of florets, and there are generally a good many florets.

You see in the engraving which I have given of this class, three parts. One is the whole of a compound flower. Then I have given you besides two kinds of florets. They are very small on the plant, when it is growing, but I have made them large, so that you can see them more easily. One of these florets contains stamens. The other contains pistils.

The Dandelion, one of the first flowers of spring, belongs to this class. How beautiful a meadow looks, with these flowers scattered over it. The Dandelion belongs to the first order, because, as you will see by examining it, each floret has a stamen and pistil of its own.

Here is the Golden Rod, too. This is a very common plant in the autumn. There are a

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Which is the floret with stamens? Which has pistils? What plants belong here? What can you say about the Dandelion? What order is it in? Why? What other plant is mentioned? What is said of it?

great many species of it. The flowers of the different species are almost always yellow. You will see the Golden Rod growing by the side of fences, in the field, or by the road side, sometimes much higher than your head. This plant belongs to the second order, because the florets in the centre of the flower have a stamen and pistil of their own, and the outside florets have only a pistil.

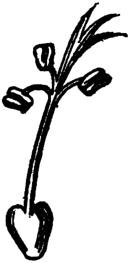
The Sun Flower is in the seventeenth class, too. It is named Sun Flower, on account of its turning round its head, as the Sun moves, so as to face the sun, at all times of the day. This plant has florets in the centre of its head, with a stamen and pistil of their own, and florets on the outside with no stamen and no pistil. So the Sun Flower belongs to the third order.

What is the order of the Golden Rod? Why? What is said of the Sun Flower? What is its order, and why?

CHAPTER TWENTY-FOURTH.

EIGHTEENTH CLASS.

In the eighteenth class, the stamens seem to grow out of the pistil. You can generally tell this class very easily, but you may sometimes be puzzled to tell the different orders apart. The orders in this class depend upon the number of stamens, and sometimes they have no filament, but have only a little speck of pollen, lying on the pistil. Then you have to look very carefully to find out what order it is.



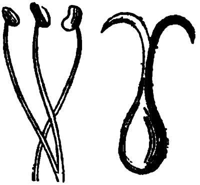
One of the prettiest flowers in the eighteenth class, is the Lady's Slipper. There are several species of it growing in the woods about the middle of summer.

NINETEENTH CLASS.

The nineteenth class has its stamens on one

How do you know the eighteenth class? What is said about the plants of this class? What is one of the prettiest flowers in this class?

corolla, and its pistils on another corolla; both on the same plant.



The Cucumber belongs to this class. You have noticed, perhaps, as you have watched this vegetable in the garden, that a great many of the flowers fall off, and no young cucumber grows from the spot where they were. The reason often is, that this flower had stamens only. Such never have fruit. The pollen is scattered from them upon the pistils in other flowers, and those with pistils produce the fruit.

The Alder, a small tree, very common in swamps, belongs to this class.

All the Pine trees belong to this class. There are a great many species of the Pine, and they are all very useful, and many of them very beautiful. All the species have a kind of fruit upon them, shaped like a cone or sugar-

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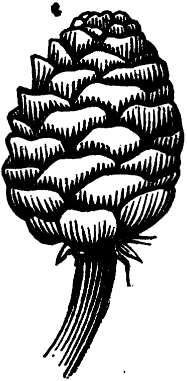
How do you know that a plant belongs to the nineteenth class? What plants are mentioned as being in this class? What is the reason so many blossoms on the Cucumber fall off without bearing?

loaf. These vary in shape and size in different species of the Pine; but they are all well worth your notice.



I do not know that there is a more useful tree in the world than the Pine. Only think of how many things we make of it. Sometimes it grows more than two hundred feet high. It is usually very straight, too. So that it makes very fine masts for ships.

The Indian Corn belongs to the nineteenth class. When you pass through a corn-field in the summer time, you see a head, or bunch of flowers, on the very top of the stalk.

I do not know what children generally call this head. I used to call it a *spindle*, when I was a boy.

This head contains the stamens of the plant.

What can you say about the Pine tree? To what class does that tree belong? What other very useful plant belongs to the nineteenth class? On what part of it are the stamens?

Have you never noticed the dust on these flowers? That is the pollen.

There are never any ears of corn on this head, because it has nothing but stamens upon it; and stamens, you know, do not bear any seed.

The little threads, lower down on the stalk, are the pistils. Children call these little threads *silk*, I believe.

Now these threads run along under the husk. The pollen, from the stamens above, falls down on the ends of these pistils, and so the seed is formed at the lower end of each thread.

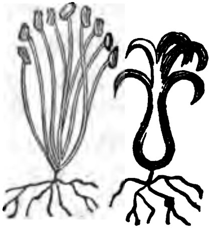
If you pull off the silk in the flowering season of the corn, you will spoil the new seed that is forming. Each young kernel has a thread for itself. There must be at least as many threads as there are kernels.

Where are the pistils of the Indian Corn? How is the seed produced? Will it do any harm to strip off the silk from the corn? How will it injure the plant?

CHAPTER TWENTY-SIXTH.

TWENTIETH CLASS.

THE twentieth class is like the nineteenth in one respect. That is, it has its stamens and pistils on separate corollas. But the difference is this: The nineteenth class has the flowers with stamens and the flowers with pistils on the *same plant*, while the twentieth class has its flowers with stamens on one plant, and its flowers with pistils on another plant.



There are a good many trees which belong to the twentieth class. The pollen from the tree bearing the stamens is blown by the wind upon another tree, which bears the pistils. The bees, too, help to remove the pollen from one tree to another. In this manner the seed

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How is the twentieth class like the nineteenth? How is it different? What else can you say about the twentieth class? How does the pollen get from the plant with stamens to the one that has pistils?

is produced upon the tree which bears the pistils.

The plants in this class which bear the stamens, are called *staminate*. Those which have the pistils are called *pistillate*.

A pistillate tree, growing alone, has been known to live a great many years without bearing any seed, until a staminate tree has grown up above the other trees in the forest, so high that its pollen was wafted to the other, and the same season, the latter has had seed upon it.

The Pitcher Plant belongs to this class. The engraving shows you how it looks.

It grows in the island of Ceylon, and it is very difficult to make it grow in this country, in gardens and green-houses.

It has a very queer leaf. It is hollow, like a cup, as you see in the picture. This cup is generally filled with sweet water. A leaf will sometimes hold a quart, or more. It has a lid

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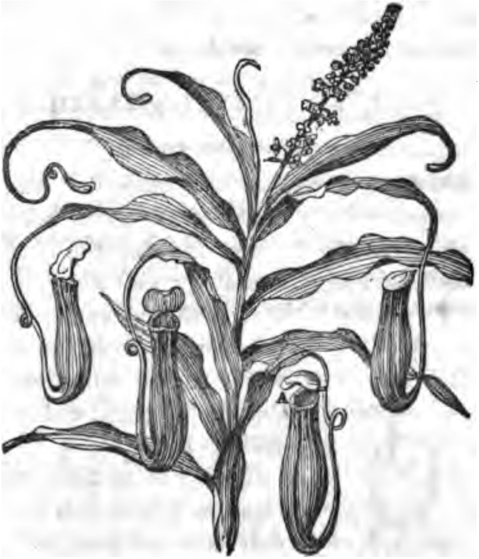
What are the flowers with stamens called? What are the flowers with pistils called? What can you say of one tree in this class? What plant can you mention in this class with a curious leaf? Where does it grow? What kind of a leaf has it?



THE PITCHER PLANT.

upon it, which opens at night and closes during the day.

The Willow belongs to the twentieth class. So do the Poplar and Juniper.

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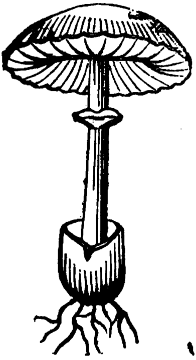
CHAPTER TWENTY-SEVENTH.

TWENTY-FIRST CLASS.



We have come now to a class that cannot boast of any great beauty.

But the plants in it were made by the same hand that scattered sweet flowers over the earth, and they teach us the same lesson, that God is great, and wise, and good.

The twenty-first class contains plants, you know, that have no stamens and pistils, or at least, none that

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Mention some common trees in the twentieth class. What is said of the plants in the twenty-first class? Have they stamens and pistils? Have they much beauty?

can be seen with the naked eye. They have no corollas, like other plants.

In the drawing which I have given you with this class, you see a Mushroom. This vegetable belongs here. There are other very different plants in this class.

The Ferns and the Mosses belong here.

That green vegetable matter, which you sometimes see in ponds, and which goes by the name of Frog Spittle, belongs to the twenty-first class.

But I will not describe this large class of plants very particularly. They are very difficult to analyze; and until you are better acquainted with the other classes, you would do well to show them some partiality. They will at present reward you better for your study. Still, I would not have you neglect these less beautiful plants entirely. By and by I hope you will become familiar with them, and when you do, you will find much in them that is curious and wonderful.

Mention some of the lower kinds of plants that belong to this class. Are the plants in this class easy to analyze?

CHAPTER TWENTY-EIGHTH.

CONCLUSION.

AND now, my young friends, I must take leave of you. It may be I shall talk to you again about Botany. But whether I do, or not, I hope you will go on with the study. It is a pleasant study. Do you not think so?

It is a useful study, too. Everything is useful, which makes us better acquainted with God; and I am sure that Botany does this. Every flower that blows tells us something about its Creator. It says, as we stoop down to look at it, and admire it,

> "The hand that made us is divine."

It is said that Linnæus, the Botanist, of whom I have before spoken, once found a very splendid flower in his rambles, which he had never seen before, and that he immediately knelt down, and thanked God for making such beautiful flowers bloom in the world.

Is Botany a useful study? Mention one way in which it is useful. What is said of Linnæus, when he once found a beautiful flower?

He was a great man, but he was not too great to remember Him who planted the lilies of the field, and taught them to bloom.

I hope, children, that you, while you love the flowers that smile so kindly upon you, will learn to love Him who clothes them in such beauty. No one has ever been so kind to you. None, among all your friends, is so deserving of your love.

Good bye, little friends, good bye!

How should we all feel, when we see how God has clothed the earth with beauty?

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